Framework for Registration, Classification, and evaluation of errors in the Forensic DNA Typing Process

Harris, H.A.; Sjerps, M.J.; Kloosterman, A.D.; Quak, A.; Geradts, Z.J.

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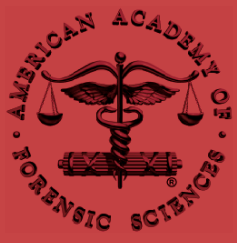

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AMERICAN ACADEMY OF FORENSIC SCIENCES
410 North 21st Street
Colorado Springs, CO 80904
Phone: (719) 636-1100
Fax: (719) 636-1993
E-mail: membship@aafs.org
Website: www.aafs.org

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of ineffective and effective root cause analysis will be presented. Attendees will learn the process of asking "why" five times to get to the source of the non-conformance. In addition, participants will learn why "blaming the individual" is missing the point of the root cause process.

Forensic specific examples provided will include contamination in postmortem drug analysis cases after incomplete cleaning of a blender carafe and the Federal Bureau of Investigation (FBI) laboratory's review of compositional bullet lead analyses cases. These examples will demonstrate how a thorough root cause analysis benefits the laboratory organization, the laboratory employees, and the laboratory customers.

Root cause analysis is a skill that must be learned, a process that requires continuous improvement, and a process that will require resources. It's too costly, some might say. Are you willing to accept the risk of not doing root cause analysis well?

*"A bad system will beat a good person every time." ~**W. Edwards Deming***

Root Cause Analysis, Continuous Improvement, Corrective Action

W13 Framework for Registration, Classification, and Evaluation of Errors in the Forensic DNA Typing Process

Howard A. Harris, PhD, JD, University of New Haven, Forensic Science Program, 300 Boston Post Road, West Haven, CT 06516; Marjan J. Sjerps*, Laan van Ypenburg 6, The Hague 2497GB; Ate D. Kloosterman*, Netherlands Forensic Institute, Laan van Ypenburg 6, The Hague 2497 GB, NETHERLANDS; Astrid Quak, MS*, Laan van Ypenburg 6, 2497 GB , NETHERLANDS; and Zeno J. Geradts, PhD*, Netherlands Forensic Institute, Ministry of Justice, Laan van Ypenburg 6, Den Haag, SH 2497 GB, NETHERLANDS*

The goals of this workshop are to encourage participants to accurately and truthfully record and document quality issues in their own forensic DNA laboratory and to teach attendees how to deal with such issues in the context of a case. A proper way to deal with errors is an essential tool to further improve on everyday forensic practice.

This presentation will impact the forensic science community by explaining how the precise magnitude of the error rate in forensic DNA typing is difficult to estimate, with the principal reason being the lack of a universally accepted definition of error in the professional society of forensic DNA typing laboratories.

Although DNA analysis is considered as one of the most reliable forensic tools available today, errors can be made during the course of the analysis. As this has a huge impact on the evidential value of a DNA match, there is a growing interest for actual data on the accuracy and error rates of forensic analyses and a more refined analysis of different types of errors and their causes.[1]

In the report *Strengthening Forensic Science in the United States: A Path Forward*, the National Academy of Sciences refers to error rates as *misidentifications:* "proportions of cases in which the analysis led to a false conclusion (as the percent of incorrectly identified cases among all those analyzed)." The error rate includes both type 1 errors (wrongful reported match) and type 2 errors (wrongful reported exclusion). A major limitation of this approach is that the majority of errors in the DNA typing process do not lead to a misidentification. The consequence is that the majority of errors and near failures in the typing process will not be registered and will potentially stay undetected. The precise magnitude of the error rate in forensic DNA typing is therefore difficult to estimate, with the principal reason being the lack of a universally accepted definition of error in the professional society of forensic DNA typing laboratories. The Netherlands Forensic Institute (NFI) has developed a comprehensive framework that allows for the classification, registration, and evaluation of errors in the forensic DNA typing process. In relation to the analysis of biological samples, the NFI has defined "internal quality issue notification" as *any* event that can lead to a failure or diminished quality of the analysis. These internal quality issue notifications have been benchmarked and evaluated using actual workload data from the department of Human Biological Traces of the NFI (over 400,000 DNA analyses) in the period 2008-2012.

This workshop will share data and the outcome of evaluations with the forensic community.

After attending this workshop, attendees will understand: (1) when an "internal quality issue notification" is made; (2) how an "internal quality issue notification" is made; (3) how "quality issue notifications" are assessed and evaluated; (4) how this can be used for benchmarking and process improvement; (5) how quality issue notifications are graded by potential impact and actual impact; (6) when and how the judicial system is informed; (7) when and how the public is informed; and, (8) how to deal with error rates in the context of a specific case.

In the first part of this workshop, an outline of the web-based NFI Quality On-Line Incident & Report Management system and an explanation of the procedures that allow for reporting quality issues in this system are given.[2] These presentations include details on the NFI work load, the data on the number of quality issue notifications over the years 2008-2012, and procedures on the assessment of quality issue notifications (necessary corrective actions taken, identification of the root cause of the quality issue, grading of notifications by potential impact, and actual impact). Also, essential benchmarking data on the performance of forensic DNA-typing in comparison with similar scientific disciplines (genetic testing centers) is presented.

The second part of the workshop focuses on impact analysis, explaining the framework that allows for an assessment and evaluation of the consequences of quality issue notifications for the conclusions of the DNA expert. Examples of errors with high and low potential and actual impact on the case will be presented.

The final session of this workshop discusses how the probability of an error affects the evidential value of a DNA match in a case. Discussion will include different views on how the DNA expert should incorporate the probability of an error in his or her report and will explain how the NFI deals with this.

References:

1. W.C. Thompson, "Tarnish on the 'gold standard:' Understanding recent problems in forensic DNA testing." The Champion, 30(1): 10-16 (January 2006).
2. www.qualityonline.com

Error Rates, DNA, Laboratory Management

W14 Postmortem Monocular Indirect Ophthalmoscopy

Patrick E. Lantz, MD, WFU School of Medicine, Dept of Pathology, Medical Center Boulevard, Winston-Salem, NC 27157-1072; and Candace H. Schoppe, MD*, New York City OCME, 520 1st Avenue, New York, NY 10016*

The goals of this presentation are to: (1) differentiate between direct and indirect ophthalmoscopy, noting advantages and limitations of each technique for the postmortem detection of fundal hemorrhages; (2) discuss the fundal location of retinal hemorrhages relative to their projected aerial image during monocular indirect ophthalmoscopy; and, (3) on a fundal diagram,